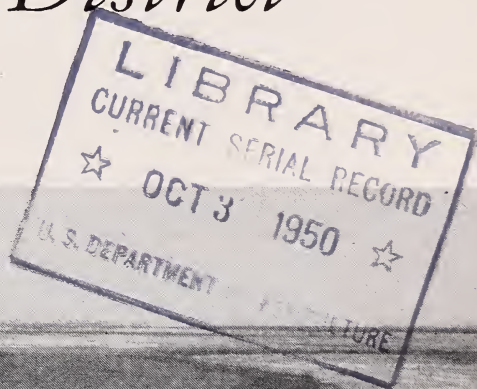


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Ag 84 Pro
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Conservation Farming in the Slope-Hettinger Soil Conservation District North Dakota



Barley on the contour, cut and in the swath ready for the combine. This field yielded 61 bushels of barley per acre. The buffer strip in the center is bromegrass.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FOREWORD

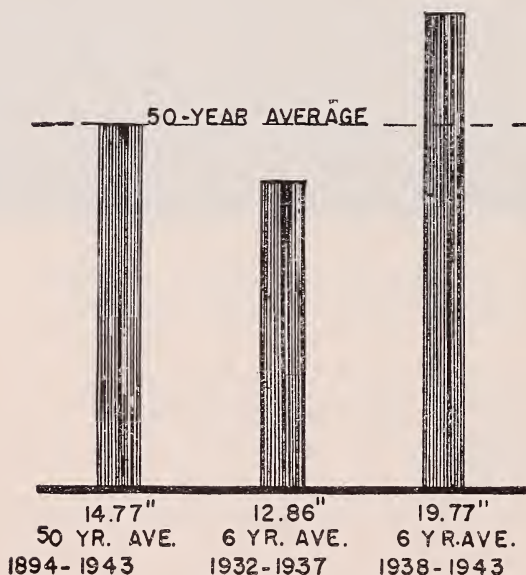
To the Farmers of the Slope-Hettinger Soil Conservation District:

You first organized the Slope-Hettinger Soil Conservation District in 1938. In 1941, you voted in the 20 townships in eastern Hettinger County. This addition increased your district to its present size of 1,082,880 acres. You have made good progress toward stopping erosion during the 12 years since the district was organized. We, the district supervisors, feel that you are entitled to a report of what you have accomplished as of January 1, 1950:

Farm conservation plans written (number)-----	540
Land under farmer-district agreement (acres)-----	328,476
Soil conservation surveys (acres)-----	528,044
Farm windbreaks (acres)-----	320
Contour strip cropping (acres)-----	19,592
Wind strip cropping (acres)-----	116,703
Farm and ranch ponds (number)-----	149
Springs developed (number)-----	19
Gully diversions built (linear feet)-----	21,120
Permanent grass seeding (acres)-----	7,744
Roadside erosion control (miles)-----	55

You can see that much has been done. But you can also see there is a big job yet to do. However, we have the organization and the help to do it.

Here is a word of caution. The climatic conditions make it unwise for us to plow up any more grassland. Dry years always bring about an increase in soil blowing. Keeping land covered is all that will avoid



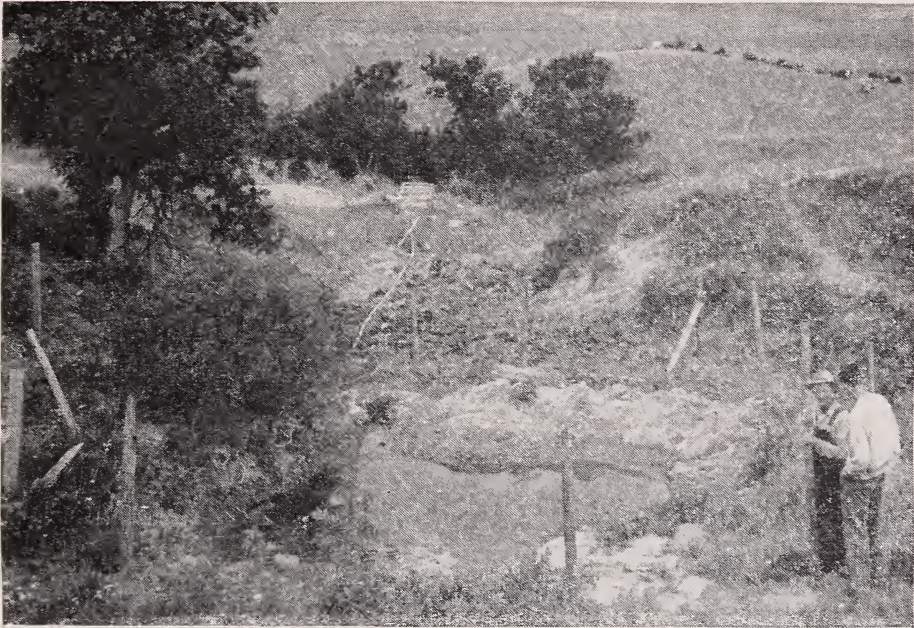
this type of erosion. We must convert about 20 percent of the present cropland to grassland if we are to conserve our soil and water resources.

Look carefully at the chart. We know that weather is the factor that limits our crop production. This chart shows that for the 50 years from 1894 to 1943 the average yearly rainfall was about 15 inches. In the 6 years from 1932 to 1937 it averaged about 13 inches. This was less than 2 inches be-

low the 50-year average. Since 1938, the average yearly rainfall has been about 20 inches, nearly 5 inches above the 50-year average. The wet years were much farther above the average than the dry years were below it.

We do not know whether the good conditions of the last few years are going to continue or not. No one can tell us that. Neither do we know whether we are going to have dry years as we had in the 1930's. What we want to stress is that we have no right to expect the good years to continue. Judging from weather records, we can expect drier years. Let's not be unprepared.

BOARD OF SUPERVISORS,
THEO MONKE,
GEORGE JALBERT,
LOUIS VASEY.



A spring which has been opened up with dynamite on the Charles Bock farm. You can see the pipe and watering trough below the spring, in the background.

This publication was prepared by the Slope-Hettinger Soil Conservation District, the Soil Conservation Service, the North Dakota Agricultural Experiment Station, and the North Dakota Extension Service, cooperating.

YOU MUST KNOW YOUR LAND

In order to plan your farm for conservation farming you need to know exactly what kind of land you have. Part of the technical help of your district is to make a conservation survey of your farm. From this survey the best use of each piece of land is determined.

A soil-conservation surveyor walks over your land and examines it carefully. He uses a spade to take samples, so that he can examine the different layers of soil. He measures the slope with a hand level. He also measures how much soil you have lost by wind erosion and by water erosion. He puts the information he gathers on a conservation-survey map and it is used to classify the land.

From the conservation survey we have learned that 58 percent of the land is farmed and 42 percent is grassland. Some land now cultivated should not be farmed, but there is some land in grass that could be farmed if necessary.



Here is the type of wet spot where machinery cannot be used to build dams or water holes. If a hole for water storage is to be built it must be done with dynamite.

This picture was taken on the Frank Kenny farm.

What Kind of Soil Have You?

The soil-conservation scientists found 78 different soil types in the district. They are shown on the maps by numbers. Each, however, fits into one of the following groups.

Heavy Soils.—Soils that take in water slowly. They cover 29 percent of the district and include:

Deep soils that take in enough water for good grain crops.

Slightly scabby soils fairly good for grain crops. (Scab spots do not grow plants.)

Shallow gumbo soils that take in too little water for cropping, and heavy scabby soils.

Poorly drained soils in lake basins and along some streams where they are flooded too often to be farmed.

Loamy Soils.—Soils that take in water at a moderate rate. They cover 36 percent of the district and include:

Deep soils that are the best soils in your district for crops.

Shallow and stony soils too dry or rocky for crops.

Wet soils too salty for crop production.

Moderately Sandy and Sandy Soils.—Soils that take in water fast. They cover 24 percent of the district and include:

Deep soils good for corn and small-grain crops.

Shallow, gravelly, or stony soils not suited for crops.

Very Sandy Soils.—Soils that take in water very fast. They cover only 4 percent of the district and include:

Deep soils that produce fair crops with good farming. They should be in grass most of the time to keep them well supplied with organic matter and to control wind erosion. Shallow soils too dry for crops.

Gravelly, Stony, and Shallow Soils.—Soils that for the most part take in water fast. They include:

Deep soils over gravel that take in water rapidly, hold part of it, and are fair for cropping.

Shallow and rough soils that are not fit for cropland but usually make good grassland.

Wasteland and mine dumps, too rough, bare, or steep even for good grassland.

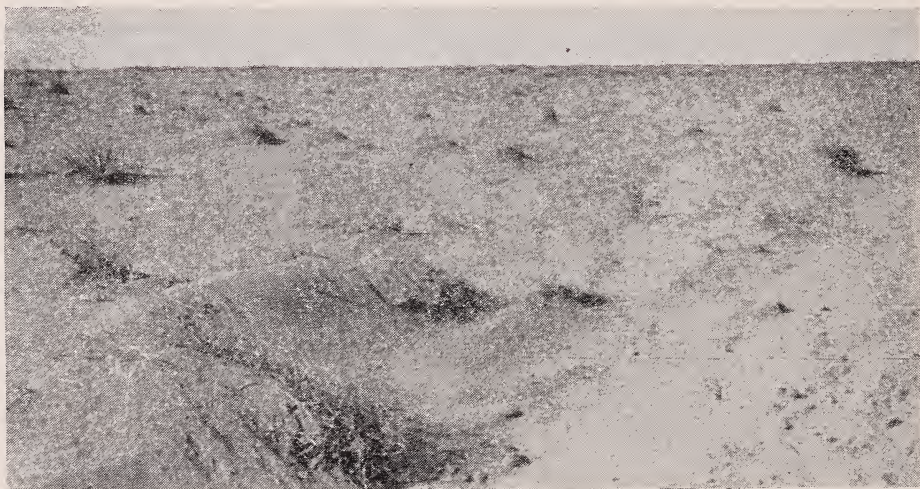
How Much Soil Have You Lost?

The amount of wind and water erosion and the dust deposits, drifts, gullies, and blow-outs that may be on your land are also shown on the survey map. Sheet erosion is the loss of a rather uniform layer of soil. This type of erosion is heaviest on your loamy and gumbo soils. Wind erosion may damage any of your soils if they are unprotected. Sandy soils are eroded very easily by wind if they are not protected. But sandy soils are seldom damaged by water unless they are frozen or are very wet.

Gullies are shown on a survey map by red dot-and-dash lines that show both how long and how deep they are. To show shallow gullies, each dash is followed by four dots. Two dots after dashes indicate deep, uncrossable gullies.

Gullies are becoming a problem on some of your land. The gullies in the pictures on page 7 and page 20 would be pretty hard to cross. If you have gullies like these on your farm, you should try to stop them as soon as possible. Once they become deep and wide, it will cost you a great deal to fill them or try to stop them from becoming bigger.

Some wind and water erosion has occurred on all land in the district. Most of the damage has been slight, but 26 percent of the land has been eroded enough to cause concern. Some of it has been damaged very much. More than half of the damage has been done by wind erosion—the blowing and drifting of soil.



A badly drifted field of sandy soil.



Here is a field boundary drifted with blown soil. It is 12 miles south of New England. The picture was taken in 1939 after a high wind.



Sheet and gully erosion caused by a single rain on summer-fallowed land. South of New England, June 1941.



Here is a deep gully cutting across a field. It is so deep that the land could no longer be used for crops. Crested wheatgrass has been seeded on the land.



Deep silt deposit, washed from one 60-acre field and spread out on the flat during one flash rainstorm, Hettinger County.

KINDS OF LAND IN YOUR SOIL CONSERVATION DISTRICT

When the land has been mapped, you and the Soil Conservation Service technicians assigned to the district have information that will help you solve your conservation and land-use problems. The colors on the capability map of your farm show the different kinds of land. They show, too, where different kinds of farming are needed if soil and moisture are to be saved. The kind of soil, amount of erosion, and slope are the basis for dividing the land into these capability classes.

All of the land in the Slope-Hettinger Soil Conservation District fits into six classes—II, III, and IV, suitable for cultivation, and VI, VII, and VIII, not suitable for cultivation. No land in this area falls in class I or in class V. The different land classes are explained briefly as follows. Pages 8 to 17 tell you more about each class of land and gives conservation practices for each.

Class II land can be farmed continuously. You can save your soil from erosion by being careful how you farm it.

Class III land also can be farmed continuously, but you must be much more careful or it will erode. It is not so nearly level as class II land.

Class IV land may be cultivated for short periods, but your farm will be better if you leave it in grass most of the time.

Class VI land is not suited for farming but is best suited for grass.

Class VII land is not suited for farming, and you must be careful when you graze cattle on it or it will erode.

Class VIII land is not suited for crops or grass. A strip-mine dump is an example of this type of land.

HOW TO CONSERVE THE LAND THAT IS SUITABLE FOR CULTIVATION

You know your farm—the best areas, the gumbo spots or sandy spots, the drifts or gullies. If you use the conservation-survey map and your previous experience as guides, you can figure out the best way to handle any field or piece of land. Study the next few pages. They tell you about rotations and conservation measures that fit your land.

1. Use crop rotations that are suited to your farm and locality.
Corn or summer fallow followed by 2 years of grain is good.
Corn is better than summer fallow on all but the gumbo soils if you have livestock enough to use the corn.
2. Grass should be a part of every rotation. It is best if 15 to 25 percent of your cropland is kept in grass all of the time.
You can work your land into a grass rotation gradually. Seed grass the first year. Make new seedings every 4 to 6 years and plow the old stands up.
3. When grazing stubble or other crops, always leave enough cover on the ground to prevent the soil from blowing or washing.
4. Use all barnyard manure. Spread it on grassland or land that is to be summer-fallowed.
5. Control weeds to conserve moisture. Weeds can take moisture from your fallow land if you do not control them.
6. Use subsurface tillage to keep stubble or stalks on the surface.
7. Seed drainage channels to grass. This will help keep gullies from starting.
8. Do not burn stubble or straw. You should leave it on the surface to help hold moisture.
9. Do your tillage operations at the right time of the year.



Julius Homelvig farm as it appears from the air. This land was contoured in the spring of 1945. The conservation plan was established as a demonstration in Slope County.



Class II land along a stream in the New Hradec-Hirschville district. Class II land in your district is like this—nearly level, loamy, and fertile.

Class II Land

(Colored yellow on your conservation-survey map)

Class II land is made up of loamy and clay soils on level benches and uplands. It has not been badly damaged by erosion. The picture shows some class II land in a soil conservation district near yours. Heavy clay soils in this class total about 9 percent and the loamy soils 13 percent of your district. In all, about 22 percent of your district is class II land.

Crop Rotations for Class II Land

1. One year of corn or summer fallow followed by 2 years of small grain.
2. One year of corn or summer fallow followed by 1 year of small grain.

You should figure out a rotation that leaves the land in a grass-and-legume mixture 5 out of every 20 years.

Practices Which Will Help You Control Erosion

It is easy to prevent or control erosion on class II land. Here is what you can do:

Wind strip-crop your land with strips not over 20 rods wide.

Contour strip-crop on even slopes.

Plant narrow strips of corn or leave 4 or 5 rows of corn standing every 10 to 15 rods in order to prevent soil blowing.



Gullies opened up on class III cultivated land by the runoff from one short, heavy rain. The field is near New England. If you have any land like this you should try to prevent gullies. Gullies are hard to control on class III land once they get started.

Class III Land

(Colored red on your conservation-survey map)

The following soils, all of which are slightly to moderately eroded, are included in the class III land in your district :

Deep heavy soils on rolling and sloping land.

Deep silty soils on rolling and sloping land.

Deep sandy soils with heavy or loamy subsoils.

Deep sandy soils on flats, level stream valleys, and gentle and rolling slopes and benches.

Deep loamy and sandy soils that have gravel beneath them, which are usually found on benches such as those on which Regent and New England are located.

Crop Rotations for Class III Land

1. One year of row crop or summer fallow and 2 years of small grain.
2. One year of summer fallow and 1 year of small grain.

Fifteen to twenty-five percent of the land in grass each year.

Practices That Will Help You Control Erosion

Erosion must be carefully controlled on class III land. It is not nearly so level as class II land.

Save all crop residue, stubble, and straw, and leave it on the surface.



Contour strip cropping on class III land in Morton County. This land is similar to some of the land in your district.

Contour strip crop to help control wind and water erosion. Your strips should be no wider than 15 rods; on sandy class III land no wider than 10 rods. Sandy land blows more easily than other land.

Wind strip crop with strips not wider than 15 rods; not wider than 10 rods on sandy land.

On sandy land leave buffer strips of tall-growing crops such as corn to help prevent soil blowing.

Class IV Land

(Colored blue on your conservation-survey map)

Class IV land in your district includes:

Deep very sandy soils on gently to strongly rolling uplands. They are only slightly eroded.

Sandy soils on rolling uplands that are eroded quite a bit.

Moderately deep moderately tight heavy soils on rolling uplands. They may be somewhat scabby.

The sandy land in class IV is more likely to blow than any other land in the district. All land in class IV should be in grass at least half of the time. You can easily see why. And you must be more careful when you till class IV land or it will blow.

Practices That Will Help You Control Erosion

You must do the following if you are to control erosion on class IV land during the periods you farm it:

Leave plenty of stubble and other plant straw on the surface if you summer fallow.

Contour or wind strip crop with strips not more than 10 rods wide.

Use buffer strips of corn to help stop erosion by wind.

Use crop rotations that provide grass at least half of the time.



Wind strip-cropping and contour farming on farms in the Bowman County Soil Conservation District, as seen from an airplane. In the foreground you can see Lawrence Faris' contouring.

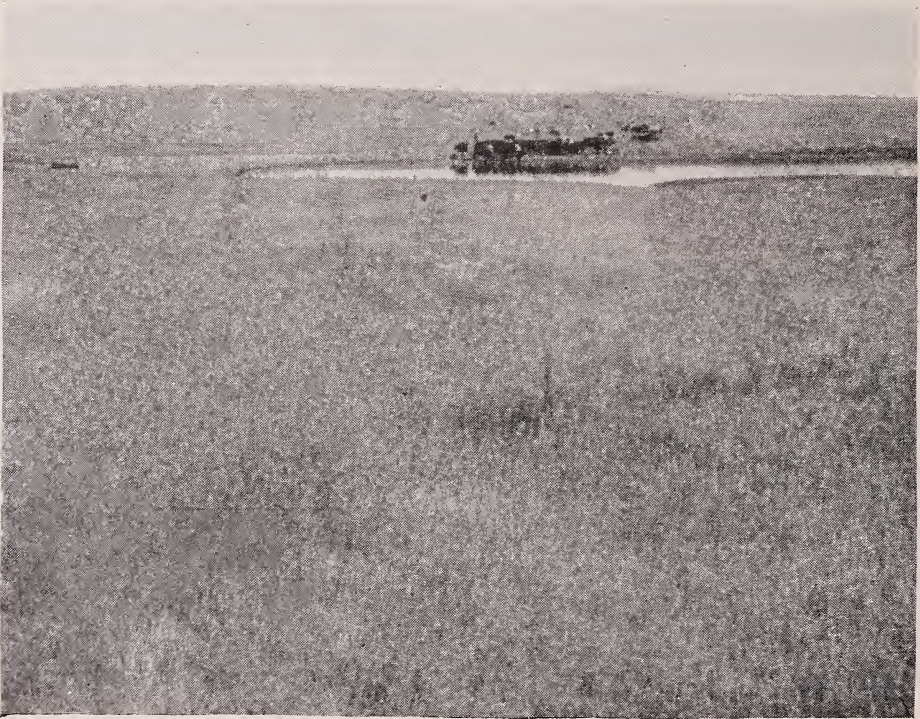


Wind strip-cropping on class III land. This picture was taken from the top of West Rainy Butte, near New England. You can see how the narrow strips are arranged to help stop wind erosion.

PASTURE AND HAY LANDS OF YOUR DISTRICT

Most of the native prairie land available for grazing has a good cover of grass. There is little danger of erosion except on the sandy or very sandy soils. Since good pastures generally furnish the cheapest feed for your livestock, it is to your advantage to prevent overgrazing. These things can be done to help all pastures and ranges in the district:

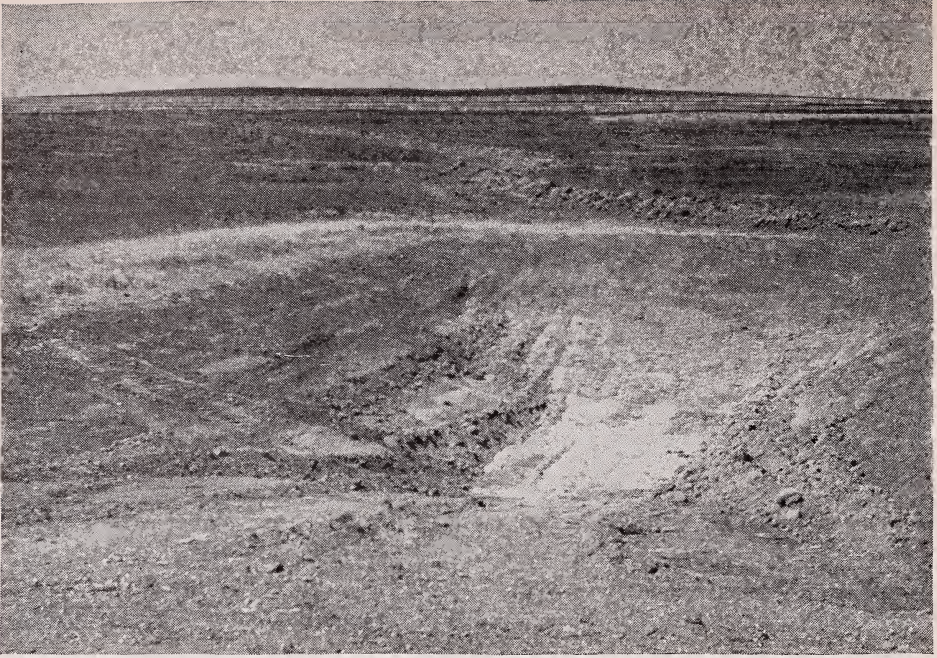
1. Begin grazing only after the grass has a good start.
2. Have grass such as crested wheatgrass for early spring and late fall pasture and for hay. This will enable you to take better care of your native grass pasture.
3. Move sheep so that they graze pasture evenly. This conserves the grass and helps control stomach and intestinal worms.
4. Place salt in far corners and away from water to distribute grazing.
5. Build water holes and dams or develop springs in different parts of the range so that grazing will be more uniform.



Here is a good pasture and water hole in the Slope-Hettinger Soil Conservation District. It is in section 16 of Rifle Township.



(Upper) A wet spot on the George Hedman farm in Bowman County blasted with dynamite, and (lower) the water hole that resulted. The water hole is more than 100 feet long, about 30 feet wide, and 10 feet deep. Six hundred pounds of dynamite were used.



A newly completed water hole on the William Jalbert farm about 20 miles southwest of New England.



This picture, taken from an airplane, shows a dam and water hole. The dam was built in the spring of 1945 with district-owned equipment which the farmer rented.

HOW TO CONSERVE THE LAND NOT SUITABLE FOR CULTIVATION

Class VI Land

(Colored orange on the conservation-survey map)

Class VI land in your district is too shallow, steep, sandy, stony, gravelly, severely eroded, or wet for you to farm. It includes all land that has more than 9 percent slope and all alkali soils and soils with rough and steep slopes. This land should be kept in grass. Cultivate it only enough to establish a good grass cover. Control grazing to encourage the growth of desirable grasses.

Class VII Land

(Colored brown on the conservation-survey map)

Class VII land in your district is shallow or very sandy land, such as dunes and sandy wash along streams. You must regulate grazing very carefully to control erosion. There is very little of this land in your district.

Class VIII Land

(Colored purple on the conservation-survey map)

This includes barren land, such as mine dumps and wasteland in the Badlands. There is very little in your district.



This is class VI land such as is found in Slope, Hettinger, Stark, and other counties in this area. So steep as to be unfit for crops, it has a good grass cover and is good grazing land.

YOUR TREES AND HOW TO CARE FOR THEM

A few trees along the main streams and on the north side of high buttes are about all that are native in your district. But there are many places where you need tree windbreaks and shelter belts. Windbreaks have been planted in the district since 1916. They have succeeded where the right kinds of trees were planted and cared for properly. A good windbreak gives protection in winter to feed lots and farmsteads. Here is what you should do to establish a good windbreak:

Select the right kinds of trees.

Summer fallow the site a year before the trees are planted.

Plant on the contour if the land is sloping.

Build fireguards and fences to prevent burning and grazing.

Cultivate the trees as long as you can. This helps to conserve moisture.

Plant fruit trees on the sheltered side when the rest of the windbreak has grown enough to protect them.



Here is a 4-year-old shelter belt on the Joseph Rettinger's farm. It looks good, doesn't it?



This is a shelter belt and wildlife area planted by John F. Krank along the shore of the pond on his farm, a few miles south of Dickinson. Note how the rows follow the contour.

WILDLIFE

Trees, shrubs, and bushes will attract wildlife. If you like to have birds around your place, plant shrubs and trees that will furnish food and shelter for them. You might want to make special plantings for wildlife in coulees and draws or along the creeks that run through your farm. The picture on this page shows what one man in Stark County did along the shore of the pond on his farm. Wildlife plantings must be protected from livestock and fire.

You can get information about the kind of trees to plant from your county extension agent or from the soil conservationists working with your district.



One-rod buffer strips of grass left between each contour strip on land broken out of native grass on the Carlyle Bock farm near New England. This helps to control wind erosion.



Here is a deep gully more than 1,500 feet long. It has hindered cultivation on this farm.

WHAT ONE FARMER DID WITH HIS FARM

The farm shown on the maps on pages 22 and 23 is operated for the production of cash grain crops and feed for livestock. There were 16 head of cattle on the farm. As shown on the conservation-survey map, the land was used as follows:

	<i>Acres</i>
Cropland	486
Native grass pasture	85
Tame grass pasture	33
Idle land	7
Farmstead	13

The Problems on This Farm

Gullies along the west side of the northern half section seriously hindered farming of the fields there. Full use of the pasture by livestock was prevented by the lack of water.

Gullies in the northern part of the southern half section had become deep and uncrossable. Sandy hills at the southern end were wind eroded and some water erosion had occurred on the sloping land. The creek channel on the eastern side was wet in the spring.

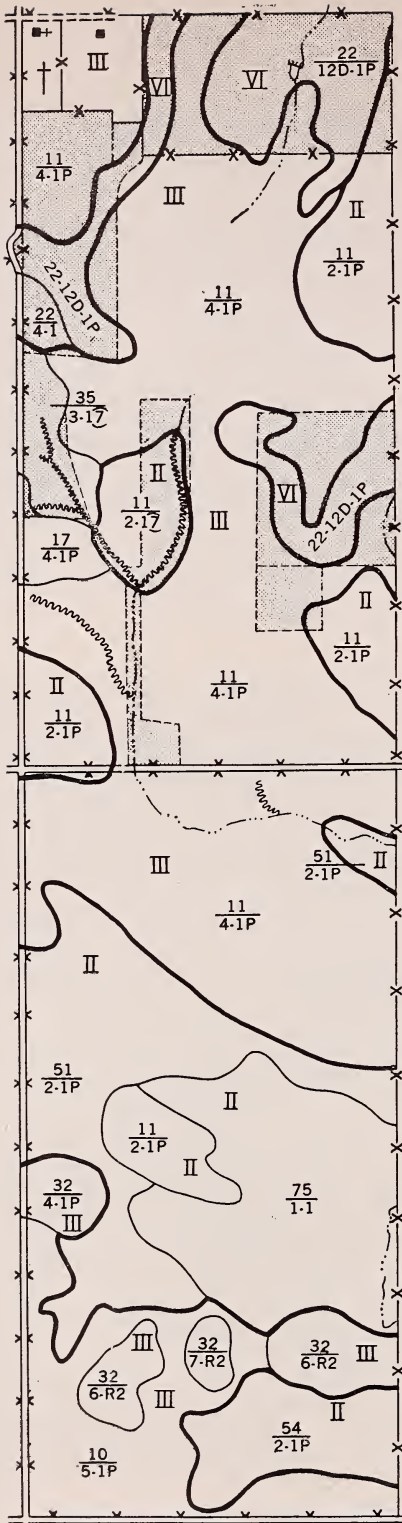
How These Problems Have Been Solved Under a Conservation Plan

The gullied area along the west side of the northern half section was seeded to grass. A grassed waterway and check dam were built in the gully that crosses the cultivated field. A dam and water hole was built in the strip of grass to the east of this field. Another was built in the field of grass to the east of the farmstead. Better use of the pasture has resulted from the construction of these dams and water holes. The additional hay land enabled this farmer to increase the number of livestock.

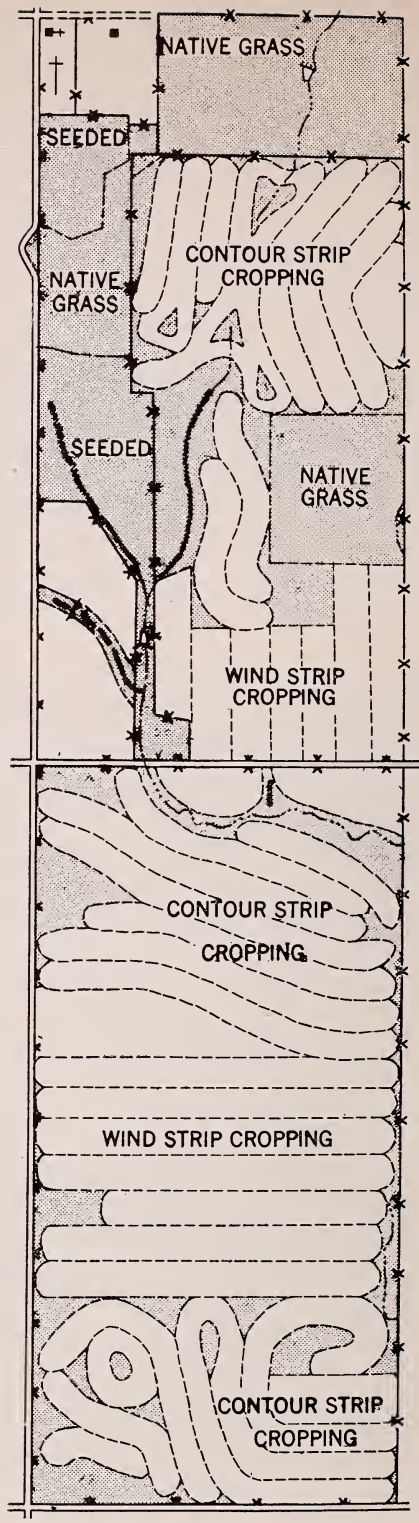
On the southern half section, a grassed waterway was established along the creek and gully on the east side. The rest of the creek channel is also now in grass. Except for a few small areas, the class III land is contour strip-cropped and the class II land is wind strip-cropped. Grass strips between the contoured fields and at the ends of the wind-stripped fields leave part of the sandy land out of cultivation. This helps to prevent soil blowing. Class VI land has been seeded to grass.

The farm unit is now made up as follows:

	<i>Acres</i>
Contour strip-cropped	217
Wind strip-cropped	146
Block-farmed	53
Tame grass pasture or hay land	110
Native-grass pasture	85
Farmstead	13



Conservation-survey and land-capability map of a farm in your district.



Land use as planned in the conservation farm plan,

Land-Capability Classes on This Farm

Class II. Good land, but it must be farmed with some care. Needs wind strip-cropping and crop residue management.

Soil 11: Deep silt loam; class II areas are on gentle slopes.

Soils 51 and 54: Deep silt loams in gently sloping valleys or swales.

Soil 75: Deep clay loam in nearly level valleys.

Class III. Moderately good land that must be farmed with a lot of care. Needs contour strip cropping and grass waterways.

Soils 10, 11, and 17: Deep silt loams on moderate slopes.

Soils 32: Moderately deep sandy soil on moderate slopes.

Soil 35: Moderately deep clay loam on lower slopes; subject to gullyng.

Class VI. Land not suitable for cultivation; moderately good for grazing.

Soil 22: Shallow silt loam over soft silty shales or clays, usually on steep slopes.

Symbols on survey map on page 22 show $\frac{\text{soil}}{\text{slope-erosion}}$. Slopes are

expressed in percent. Erosion symbols 1 or 1P denote slight water or wind erosion; R2, moderate wind and water erosion; 1⑦, slight sheet erosion and deep gullies. Shaded areas were in native grass.



Airplane view of this farm which was taken after the conservation plan had been started. Compare it with the land use map on the opposite page.

HOW THE DISTRICT CAN AID YOU

You organized the Slope-Hettinger Soil Conservation District so that you could get the help you need to solve your conservation problems. The services of soil conservationists assigned by the Soil Conservation Service to your district to help you work out farm conservation plans are part of that help. Your first step is to file an application with the district supervisors. This can be done at your county extension agent's office or at the soil conservation district office. Or you may give your application to one of the district supervisors.

Here are some of the things your district can do:

1. Help you work out your farm-conservation plan.
A soil conservation surveyor will make a map that shows what kinds of land you have. Then another technician will help you plan the land use adjustments and the conservation treatments needed for the different kinds.
 2. Help you apply the farm-conservation plan to the land. Some of the things the soil conservationists can do for you are:
Make surveys for dams and water holes.
Lay out fields for contour strip or wind strip cropping.
Help you develop springs.
Check completed dams and water holes.
Help you select species of trees and sites for windbreaks.
Make surveys and plans for gully control and for waterways.
Design drainage and irrigation systems.
Help work out the best crop rotations.
Make maps showing cropping plans and rotations.
 3. Supply some equipment on a rental basis. Below is listed the equipment now available:
Tractors and attachments for building dams and water holes.
Noble weeder.
Rotary rod weeder.
Grape and berry hoes for weeding tree plantings.
Rotary scrapers.
Tree planters for planting windbreaks and shelterbelts.
 4. Secure some of the conservation materials. These include:
Seed of grasses that are not common in the area but are being introduced.
Grass seed that is difficult for the individual to locate because of limited supply.
Trees, on a share-the-cost basis.
- See your county extension agent, the Soil Conservation Service technicians, or your district supervisors for further information about conservation farming.